

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 05-085813
 (43)Date of publication of application : 06.04.1993

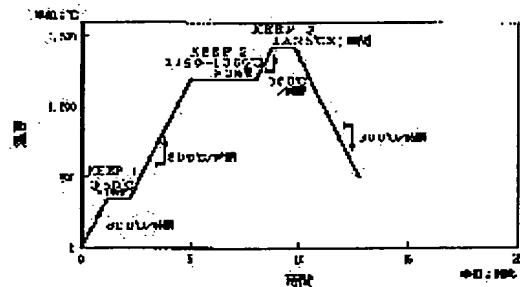
(51)Int.CI. C04B 35/16

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 (22)Date of filing : 30.09.1991 (72)Inventor : OE JUNJI

(54) PRODUCTION OF CORDIERITE CERAMIC

(57)Abstract:

PURPOSE: To improve the calcination contraction degree and the water absorptivity of the cordierite ceramic by molding a ceramic raw material comprising MgO, SiO₂, and Al₂O₃ and subsequently calcining the molding according to a prescribed calcination schedule.
CONSTITUTION: 10–18wt.% of MgO, 42–52wt.% of SiO₂ and 34–48wt.% of Al₂O₃ are compounded as ceramic raw materials and subsequently molded into a desired molding. The molding is held at a temperature [e.g 350° C for burning a molding auxiliary (methyl cellulose)] for 1hr (KEEP 1), held at 1150–1360° C for 3hrs (KEEP 2), heated at a raising rate of 300° C/hr for other periods, and subsequently held at a maximum calcination temperature of 1425° C for 1hr (KEEP 3) to produce a cordierite ceramic.



LEGAL STATUS

[Date of request for examination] 26.06.1998

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number] 3130979

[Date of registration] 17.11.2000

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

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CLAIMS

[Claim(s)]

[Claim 1] After fabricating the ceramic raw material which consists of 10 - 18 % of the weight of MgO(s), SiO₂ 42-52 % of the weight, and aluminum₂O₃ 34-48% of the weight of a presentation in a predetermined configuration, [whether a programming rate / in / for the acquired Plastic solid / a 1160-1290-degree C temperature region / is carried out in 300 degrees C/hour or less, and] Or the manufacturing method of the nature ceramics of a cordylite which consists of a process which holds with constant temperature in this temperature region for 0.5 hours or more, holds at the temperature of further 1300-1440 degrees C for 0.5 to 24 hours, and is calcinated.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]**[0001]**

[Industrial Application] This invention relates to the manufacturing method of the nature ceramics of a cordylite mainly used as a honeycomb structure object.

[0002]

[Description of the Prior Art] Nature ceramics of a cordylite (2MgO , $2\text{aluminum}_2\text{O}_3$, and 5SiO_2) Since the coefficient of thermal expansion is as low as $11 \times 10^{-7}/\text{degree C}$, it is strong to a thermal shock, and since it is a porous body, it fabricates on a honeycomb structure object and is widely used as catalyst support for automobile exhaust purification etc. When using as such catalyst support, the one where water absorption is higher tends to support a catalyst, and what also has the high activity of a catalyst is obtained. Therefore, the support of high water absorption is called for.

[0003] Moreover, although the nature ceramics of a cordylite is contracted 1 to 3% in a baking process, it was thought that dispersion in this contraction was the class of binders, such as methyl cellulose added in order to fabricate a raw material presentation, particle diameter, and ceramic powder, and polyvinyl alcohol, an amount, a front [baking] consistency, and burning temperature, and in order to make dispersion in burning shrinkage small, efforts to make fluctuation of these factors small have been paid.

[0004]

[Problem(s) to be Solved by the Invention] mixing wheat flour and rice powder which it is burned down [rice powder] for example, in a ceramic raw material at the time of baking, and make it generate an opening, in order to raise the water absorption of the nature ceramics of a cordylite conventionally **** -- (refer to JP,63-27303,B) or the ceramic raw material 100 weight section -- receiving -- graphite and carbon powder -- 1 - 30 weight ***** -- it has adjusted by things. However, in order to make a pore agent burned down, adding these so-called pore agents not only leads to the jump of a manufacturing cost, but it needed to carry out long duration maintenance at the temperature of 600 degrees C or more.

[0005] Moreover, although the raw material presentation, particle diameter, the class of shaping assistant and an addition, the consistency before baking, etc. had been managed in order to adjust the burning shrinkage of the nature ceramics of a cordylite, it was difficult to fully manage these. For example, in a batch type firing furnace and the continuous system firing furnace of a tunnel mold, there was fault that the water absorption and contraction of the nature ceramics of a cordylite which were acquired differed from each other.

[0006] Then, if this invention is possible, it closes controlling these values freely, while it raises the water absorption and burning shrinkage of the nature ceramics of a cordylite.

[0007]

[Means for Solving the Problem] An example is taken above. Chemical composition this invention 10 - 18 % of the weight of $\text{MgO}(s)$, SiO_2 42-52 % of the weight, After fabricating the ceramic raw material which consists of 2O_334 - 48 % of the weight of aluminum in a predetermined configuration, [whether a programming rate / in / for the acquired Plastic solid / a 1160-1290-degree C temperature region / is carried out in 300 degrees C/hour or less, and] Or it holds with constant temperature 30 minutes or more in a 1160-1290-degree C temperature region, and the nature ceramics of a cordylite is manufactured according to the process which holds for 0.5 to 24 hours and

is calcinated at the temperature of further 1300-1440 degrees C.

[0008] By the manufacture approach of this invention, the water absorption and contraction of the nature ceramics of a cordylite can be made high by holding in a 1160-1290-degree C temperature region, or making a programming rate small. moreover, the thing for which the above-mentioned holding time and a programming rate are changed -- free -- value adjustment of water absorption and contraction -- it can carry out.

[0009] For example, by the conventional manufacture approach, water absorption is made with 28.0% only by holding at 1210 degrees C for 1.5 hours to the nature ceramics of a cordylite which is 25.4% of water absorption, and 96.7% of contraction. Furthermore, if the above-mentioned holding time is made into 11 hours, it can be made high to 29.5% of water absorption, and 97.97% of contraction.

[0010] The reason for the ability to change burning shrinkage and water absorption by the approach of this invention is the mechanism which can explain the phenomenon of this invention although not solved completely. It is presumed as follows.

[0011] First, it is aluminum 2O_3 , MgO , and SiO_2 like this invention. It sets for a solid phase composition reaction which asks a kaolin and talc for a source, and is beta-Quartz around 1000 degrees C in the middle of a baking process. Generating is known (T. I.Barry, J.M.Cox and R.Morrel:J.Mat.Sci., 13, 594 to pp610 (1978) reference). And it is after 1200 degree C this beta-Quartz. It disappears and a cordylite crystal deposits. By this system, an elevated temperature more often generates a cordylite.

[0012] Cordylite-ization has taken place also in the 1160-1290-degree C temperature region of this invention, by the conventional manufacture approach, in order to heat to an elevated temperature, without advancing this reaction, an unreacted component fuses in primary and it is thought by carrying out liquid phase sintering that eburnation is carried out and water absorption is made low. On the other hand, when making maintenance or a programming rate late like this invention in a 1160-1290-degree C temperature region and advancing cordylite-ization, there are few residues of a component which makes liquid phase sintering start, and since the cordylite crystalized at low temperature serves as a nucleus, cordylite-ization is promoted further and sintering by the liquid phase component stops being able to happen easily, it is thought that burning shrinkage and water absorption can be made high.

[0013] In addition, the reason for having made into 1160 degrees C - 1290 degrees C the temperature region which controls baking conditions in this invention is that the effectiveness which cordylite-ization is not efficiently performed below 1160 degrees C, but raises burning shrinkage and water absorption as a result is not remarkable. Moreover, above 1290 degrees C, the direction of the speed of contraction according from the speed of a cordylite-ized reaction to liquid phase generation is because the effectiveness is not seen substantially early.

[0014] Moreover, in this invention, chemical composition of a start raw material was made into 10 - 18 % of the weight of $\text{MgO}(\text{s})$, SiO_2 42-52 % of the weight, and aluminum 2O_3 34-48 % of the weight, because this nature ceramics of a cordylite (2MgO , 2aluminum2 O_3 , and 5SiO_2) for which it asks that it is out of range was not able to be obtained.

[0015]

[Example]

It mixed so that chemical composition might become 13.5 % of the weight of $\text{MgO}(\text{s})$, SiO_2 49.1 % of the weight, and aluminum 2O_3 37.4 % of the weight, and as a shaping assistant, methyl cellulose and water were mixed, the raw material powder shown in example of experiment 1 table 1 was kneaded, the ceramic plasticity constituent was adjusted, this constituent was fabricated in the honeycomb configuration through the inside of the well-known extrusion dice for honeycomb shaping, and subsequently it dried and it was calcinated.

[0016]

[Table 1]

原料名 項目	カオリン	タルク	水酸化アルミニウム
化学組成 (wt%)			
S i O ₂	53.0	62.35	0.01
A l ₂ O ₃	33.5	0.18	
A l (OH) ₂			99.7
M g O	0.15	32.14	
F e ₂ O ₃	0.08	0.08	0.01
N a ₂ O	0.04	0.0005	0.32
K ₂ O	0.03	0.003	
T i O	0.06		
C a O	0.05	0.21	
Ig' loss	12.50	4.65	
平均粒径 (μm)	6.8	19.0	1.2
調合 (wt%)	39.83	35.0	29.17

[0017] Except carrying out maintenance (KEEP1) at 350 degrees C for 1 hour, in order to make a shaping assistant burned down as shown in drawing 1, and carrying out maintenance (KEEP2) among 1150-1360 degrees C for 3 hours, the temperature up of the baking schedule was carried out at 300 degrees C/hour in rate, with the highest burning temperature of 1425 degrees C, maintenance (KEEP3) of it was carried out for 1 hour, and it was calcinated. The temperature of the above KEEP2 is changed and the result of having measured contraction of the acquired baking object and water absorption is shown in Table 2 and drawing 2.

[0018]

[Table 2]

実験例 1

No.	本発明				比較例			
	1-1	1-2	1-3	1-4	1	2	3	4
KEEP 2 の温度 (°C)	1180	1210	1240	1270	1150	1300	1360	なし
焼成収縮率 (%)	96.6	97.7	97.7	97.2	96.6	96.7	96.7	96.5
吸水率 (%)	26.1	29.2	28.6	27.8	25.3	24.9	25.4	25.2

[0019] From this result, as for No.1-1-1-4 of this invention example, the temperature of KEEP2 showed the high value clearly to being 97% or less of contraction, and 26% or less of water absorption with 97% or more of contraction, and 26% or more of water absorption in the examples 1, 2, 3, and 4 of a comparison with this invention out of range. Therefore, by holding in a 1160-1290-degree C temperature region shows that contraction and water absorption can be made high. Moreover, it is also understood that the above-mentioned retention temperature is around 1210 degrees C that it is the most effective.

[0020] It fabricated in the honeycomb configuration like the example 1 of example of experiment 2 experiment, and subsequently it dried and calcinated. Except carrying out maintenance (KEEP1) of the baking schedule at 350 degrees C for 1 hour, in order to begin to burn a shaping assistant, as shown in drawing 3, and carrying out maintenance (KEEP2) at 1210 degrees C for 0 to 12 hours, the temperature up was carried out at 300 degrees C/hour in rate, and with the highest burning temperature of 1425 degrees C, maintenance (KEEP3) was carried out for 1 hour, and it calcinated. The holding time of the above KEEP2 is changed and the result of having measured contraction of the acquired baking object and water absorption is shown in Table 3 and drawing 4.

[0021]

[Table 3]

実験例 2

N o.	比較例	2-1	2-2	2-3	2-4
KEEP 2 の時間 (時間)	0	1	3	6	12
焼成収縮率 (%)	96.5	97.2	97.7	97.9	98.0
吸水率 (%)	25.2	27.5	29.2	29.3	29.5

[0022] From this result, No.2-1-2-4 of this invention example showed the high value clearly to being 97% or less of contraction, and 26% or less of water absorption with 97% or more of contraction, and 27% or more of water absorption in the example of a comparison whose holding time of KEEP2 is 0 hour. Moreover, if the holding time of KEEP2 becomes in 0.5 hours or more, although the rise of contraction and water absorption will be seen sharply and the R/C will fall gradually, water absorption rises to 29.5% 98% in a maximum of 12 hours, and as for contraction, it is known by that it is hardly changeful after it. Therefore, by making the holding time of the above KEEP2 into 0.5 hours or more shows that contraction and water absorption can be made high.

[0023] It fabricated in the honeycomb configuration like the example 1 of example 3 experiment, and subsequently it dried and calcinated. The result of having changed the 1160-1290-degree C heating up time, and having calcinated the baking schedule as shown in drawing 5, and having measured contraction of the acquired baking object and water absorption is shown in Table 4.

[0024]

[Table 4]
実験例 3

N o.	比較例	3-1	3-2	3-3
1160～1290℃の昇温時間 (℃／時)	300	233	108	33
焼成収縮率 (%)	96.5	96.7	97.4	97.8
吸水率 (%)	25.2	26.2	26.7	27.9

[0025] By not holding with constant temperature from this result in a 1160-1290-degree C temperature region, but carrying out a heating up time in 300 degrees C/hour or less as well as the

above-mentioned examples 1 and 2 of an experiment shows that contraction and water absorption can be made high.

[0026]

[Effect of the Invention] Thus, according to this invention, the effectiveness which makes high burning shrinkage of a sintered compact and water absorption can be done so by carrying out a programming rate in 300 degrees C/hour or less in a 1160-1290-degree C temperature region, or holding with constant temperature among the baking condition of the nature ceramics of a cordylite, in a 1160-1290-degree C temperature region for 0.5 hours or more, holding for 0.5 to 24 hours and calcinating at the temperature of further 1300-1440 degrees C. In addition, the effectiveness that the burning shrinkage and water absorption of a baking object are freely controllable can be done so by adjusting the programming rate or the holding time in a 1160-1290-degree C temperature region.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the graph which shows the baking schedule in the manufacture approach of the nature ceramics of a cordylite of this invention.

[Drawing 2] It is the graph which shows the relation between the retention temperature under baking, and contraction of the acquired baking object and water absorption.

[Drawing 3] It is the graph which shows the baking schedule in the manufacture approach of the nature ceramics of a cordylite of this invention.

[Drawing 4] It is the graph which shows the relation between the holding time under baking, and contraction of the acquired baking object and water absorption.

[Drawing 5] It is the graph which shows the baking schedule in other examples of this invention.

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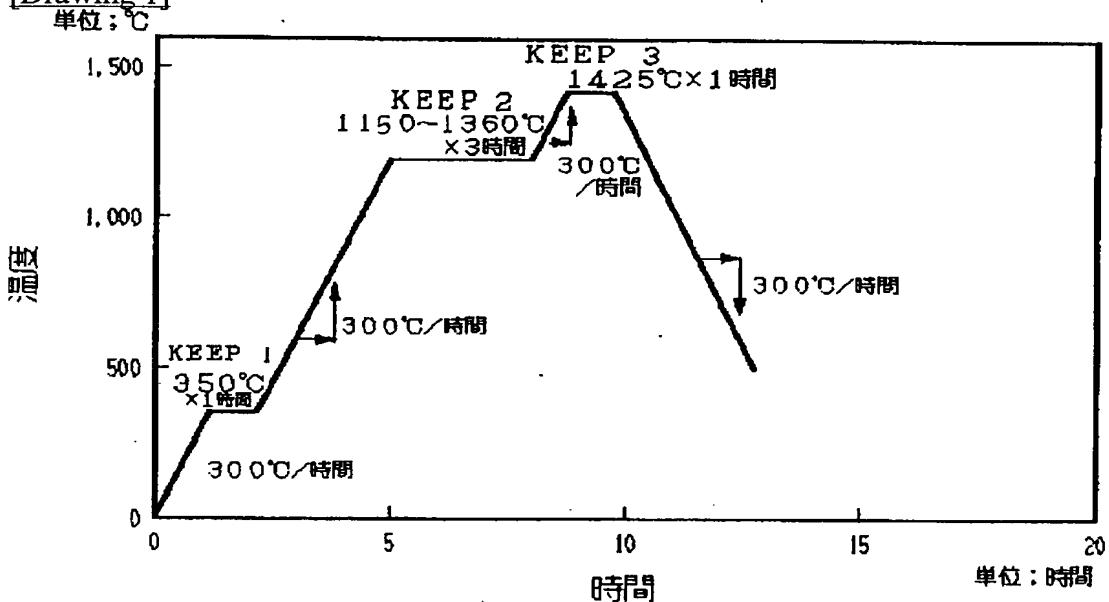
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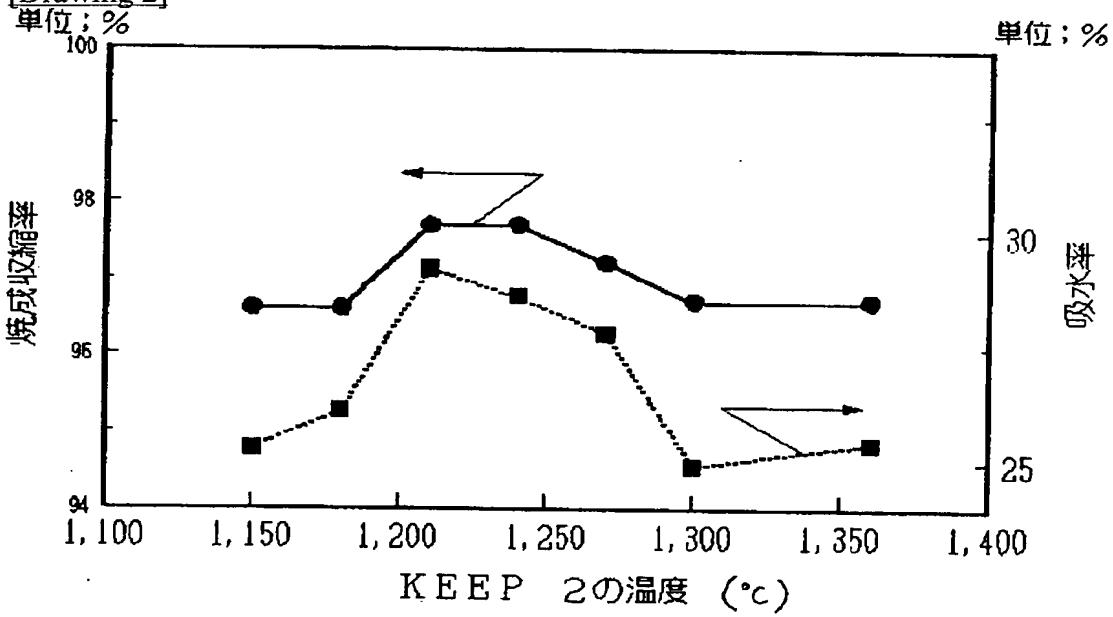
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DRAWINGS

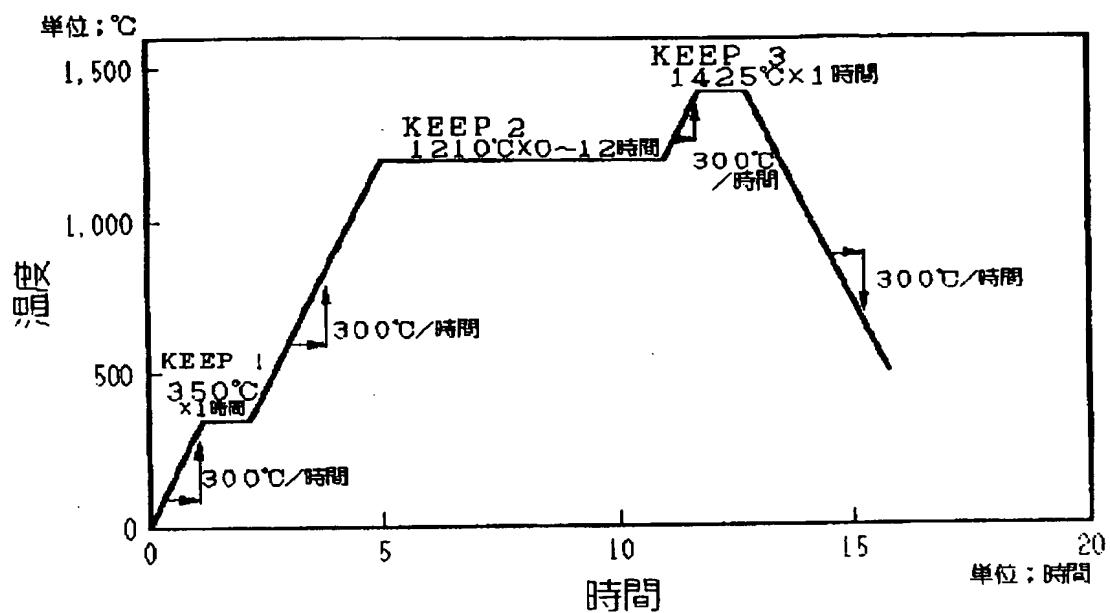
[Drawing 1]



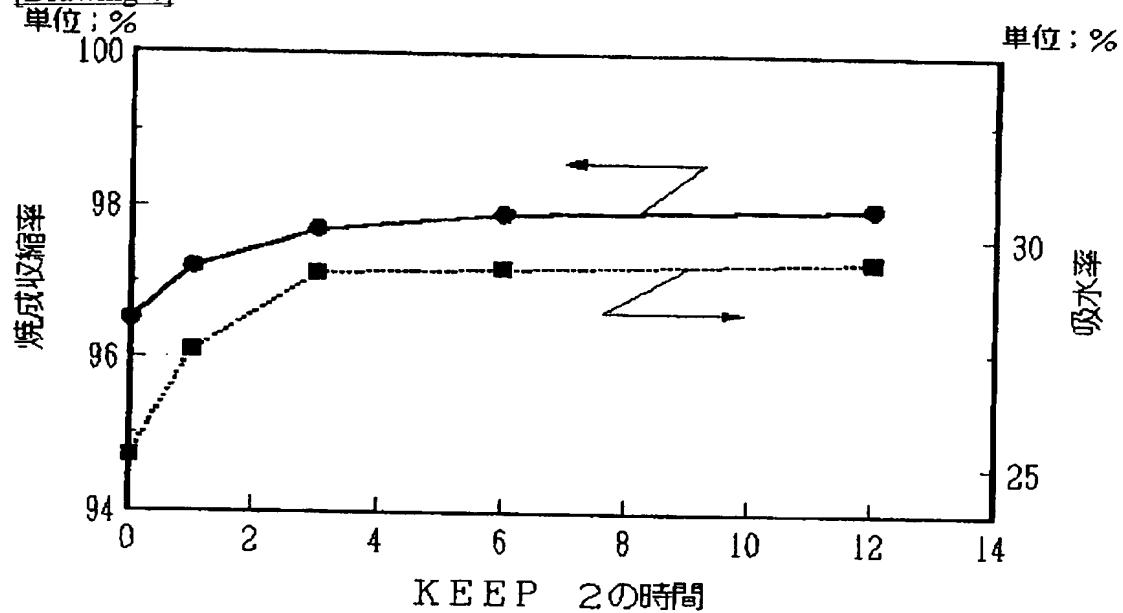
[Drawing 2]



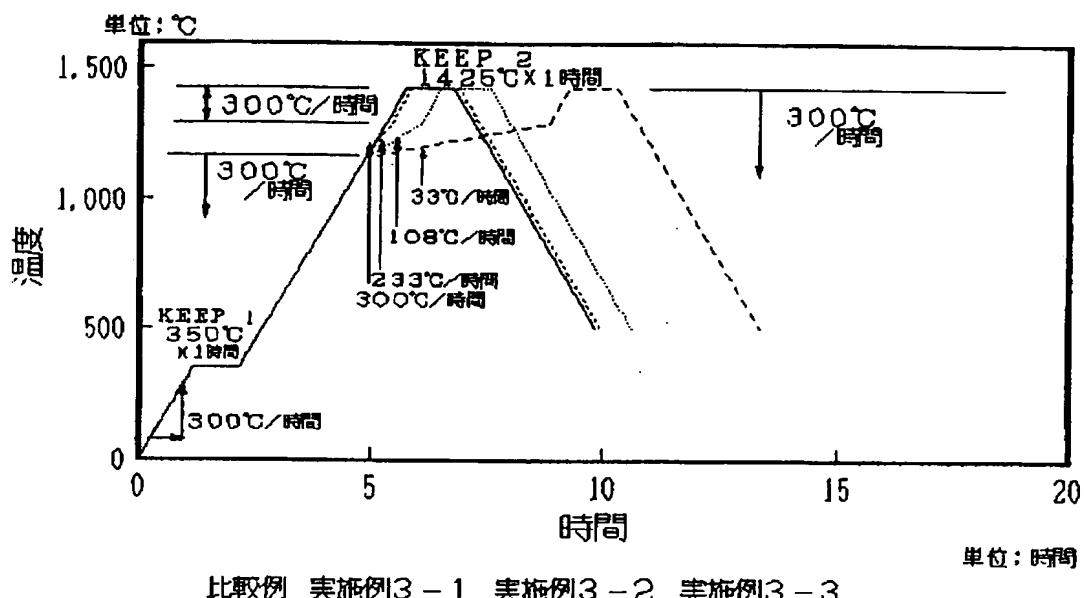
[Drawing 3]



[Drawing 4]



[Drawing 5]



[Translation done.]

(19)日本国特許庁 (JP)

(12) 公開特許公報 (A)

(11)特許出願公開番号

特開平5-85813

(43)公開日 平成5年(1993)4月6日

(51)Int.Cl.
C 04 B 35/16

識別記号 庁内整理番号
A 8924-4G

F I

技術表示箇所

審査請求 未請求 請求項の数1(全8頁)

(21)出願番号 特願平3-252110

(22)出願日 平成3年(1991)9月30日

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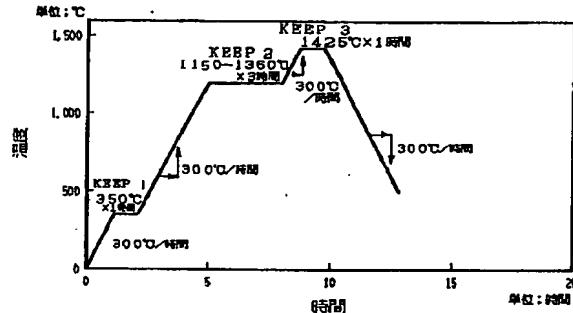
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(54)【発明の名称】 コージライト質セラミックスの製造法

(57)【要約】

【構成】コージライト質セラミックスの焼成条件中、160～1290°Cの温度域において昇温速度を300°C/時間以下とするか、または1160～1290°Cの温度域で0.5時間以上一定温度で保持し、さらに1300～1440°Cの温度で0.5～24時間保持して、焼成する。

【効果】焼結体の焼成収縮率、吸水率を高くするとともに、1160～1290°Cの温度域における昇温速度または保持時間を調節することによって、自由に焼成体の焼成収縮率と吸水率をコントロールすることが可能となる。



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【特許請求の範囲】

【請求項1】MgO 10～18重量%、SiO₂ 42～52重量%、Al₂O₃ 34～48重量%の組成よりなるセラミック原料を所定形状に成形した後、得られた成形体を1160～1290°Cの温度域における昇温速度を300°C/時間以下とするか、または同温度域で0.5時間以上一定温度で保持し、さらに1300～1440°Cの温度で0.5～2.4時間保持して焼成する工程からなるコーナライト質セラミックスの製造法。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、主にハニカム構造体として用いられるコーナライト質セラミックスの製造法に関するものである。

【0002】

【従来の技術】コーナライト(2MgO・2Al₂O₃・5SiO₂)質セラミックスは、熱膨張係数が11×10⁻⁷/°Cと低いため熱衝撃に強く、また多孔体であるため、ハニカム構造体に成形して自動車排ガス浄化用触媒担体等として広く使用されている。このような触媒担体として用いる場合には、吸水率が高い方が触媒を担持しやすく、触媒の活性も高いものが得られる。したがって、高吸水率の担体が求められている。

【0003】また、コーナライト質セラミックスは焼成工程において1～3%収縮するが、この収縮率のばらつきは原料組成、粒子径、セラミックス粉末を成形するために添加されるメチルセルロース、ポリビニルアルコールなどの結合剤の種類と量、焼成前密度、焼成温度であると考えられ、焼成収縮率のばらつきを小さくする為これらの要因の変動を小さくする努力が払われてきた。

【0004】

【発明が解決しようとする課題】従来、コーナライト質セラミックスの吸水率を高めるためには、例えばセラミックス原料に、焼成時に焼失して空隙を生成させる様な小麦粉や米粉を混合したり（特公昭63-27303号公報参照）、あるいはセラミックス原料100重量部に対しグラファイトやカーボン粉末を1～30重量部加えることによって調節してきた。しかし、これらのいわゆるボア剤を添加することは、製造コストの高騰につながるだけでなく、ボア剤を焼失させるために600°C以上の温度で長時間保持する必要があった。

【0005】また、コーナライト質セラミックスの焼成収縮率を調整するために、原料組成や粒子径、成形助剤の種類と添加量及び焼成前密度などの管理を行なってきたが、これらを充分に管理することは困難であった。例えばバッチ式焼成炉とトンネル型の連続式焼成炉では得られたコーナライト質セラミックスの吸水率や収縮率が異なるといった不具合があった。

【0006】そこで、本発明はコーナライト質セラミックスの吸水率および焼成収縮を高めるとともに、これら

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の値を自由にコントロールすることを可能ならしめるものである。

【0007】

【課題を解決するための手段】上記に鑑みて本発明は、化学組成がMgO 10～18重量%、SiO₂ 42～52重量%、Al₂O₃ 34～48重量%よりなるセラミック原料を所定形状に成形した後、得られた成形体を1160～1290°Cの温度域における昇温速度を300°C/時間以下とするか、または1160～1290°Cの温度域で30分以上一定温度で保持し、さらに1300～1440°Cの温度で0.5～2.4時間保持して焼成する工程によりコーナライト質セラミックスを製造するようにしたものである。

【0008】本発明の製造方法では、1160～1290°Cの温度域で保持するか、または昇温速度を小さくすることによって、コーナライト質セラミックスの吸水率と収縮率を高くすることができます。また、上記保持時間や昇温速度を変化させることによって自由に吸水率と収縮率の値調整ができる。

【0009】例えば、従来の製造方法では、吸水率25.4%、収縮率96.7%であるコーナライト質セラミックスに対し、1210°Cで1.5時間保持するだけで吸水率を28.0%とできる。さらに、上記保持時間を11時間とすると吸水率29.5%、収縮率97.9%まで高くすることができます。

【0010】本発明の方法により焼成収縮率、吸水率を変化させ得る理由は、完全には解明されていないが、本発明の現象を説明しうるメカニズムは、以下のように推定される。

【0011】まず、本発明のようにAl₂O₃、MgO、SiO₂源をカオリン、タルクに求めるような固相合成反応において、焼成工程の途中1000°C前後でβ-Quartzが発生するすることは知られている(T.I.Barry,J.M.Cox and R.Morrel:J.Mat.Sci.,13,pp594-610(1978)参照)。そして、1200°C以降このβ-Quartzが消滅し、コーナライト結晶が析出していく。この系ではコーナライトは高温ほどよく生成する。

【0012】本発明の1160～1290°Cの温度域でもコーナライト化が起こっており、従来の製造方法ではこの反応を進行させずに高温に加熱するため、未反応の成分が一次的に溶融し、液相焼結することにより緻密化して吸水率を低くすると考えられる。これに対し、本発明のように1160～1290°Cの温度域にて保持または昇温速度を遅くしてコーナライト化を進行させた場合には、液相焼結を起こさせるような成分の残量が少なく、また低温にて結晶化したコーナライトが核となり一層コーナライト化を促進し、液相成分による焼結が起りにくくなるため、焼成収縮率・吸水率を高くすることができると考えられる。

【0013】なお、本発明において焼成条件をコントロ

1250～1300

ールする温度域を1160°C～1290°Cとした理由は1160°C以下ではコーライト化が効率的に行なわれず、結果的に焼成収縮率、吸水率を高める効果が顕著でないからである。また、1290°C以上ではコーライト化反応のスピードより液相生成による収縮のスピードの方が早く、実質的にその効果が見られないからである。

【0014】また、本発明において出発原料の化学組成をMgO 10～18重量%、SiO₂ 42～52重量%、Al₂O₃ 34～48重量%としたのは、この範囲外であると、求めるコーライト(2MgO・2Al₂O₃・5SiO₂)質セラミックスを得られないためである。

*【0015】

【実施例】

実験例1

表1に示す原料粉末を、化学組成がMgO 13.5重量%、SiO₂ 49.1重量%、Al₂O₃ 37.4重量%となるよう混合し、成形助剤としてメチルセルロース、水を混合、混練してセラミックス可塑性組成物を調整し、この組成物を公知のハニカム成形用押出しダイス内を通してハニカム形状に成形し、ついで乾燥し、焼成した。

【0016】

【表1】

*

項目 原料名	カオリン	タルク	水酸化アルミニウム
化学組成 (wt%)			
SiO ₂	53.0	62.35	0.01
Al ₂ O ₃	33.5	0.18	
Al(OH) ₂			99.7
MgO	0.15	32.14	
Fe ₂ O ₃	0.08	0.08	0.01
Na ₂ O	0.04	0.0005	0.32
K ₂ O	0.03	0.003	
TiO	0.06		
CaO	0.05	0.21	
Ig' loss	12.50	4.65	
平均粒径 (μm)	6.8	19.0	1.2
調合 (wt%)	39.83	35.0	29.17

【0017】焼成スケジュールは図1に示すように、成形助剤を焼失させるために350°Cで1時間保持(KEEP1)し、1150～1360°Cの間で3時間保持(KEEP2)する以外は300°C/時間の速度で昇温し、最高焼成温度1425°Cで1時間保持(KEEP

3) して焼成した。上記KEEP2の温度を変化させ、得られた焼成体の収縮率、吸水率を測定した結果を表2および図2に示す。

【0018】

【表2】

実験例1

No.	本発明				比較例			
	1-1	1-2	1-3	1-4	1	2	3	4
KEEP 2 の温度 (℃)	1180	1210	1240	1270	1150	1300	1360	なし
焼成収縮率 (%)	96.6	97.7	97.7	97.2	96.6	96.7	96.7	96.5
吸水率 (%)	26.1	29.2	28.6	27.8	25.3	24.9	25.4	25.2

【0019】この結果より明らかに、KEEP 2 の温度が本発明の範囲外である比較例1、2、3、4では収縮率97%以下、吸水率26%以下であるのに対し、本発明実験例のNo. 1-1～1-4は明らかに収縮率97%以上、吸水率26%以上とともに高い値を示した。したがって、1160～1290℃の温度域で保持することによって、収縮率、吸水率を高くできることがわかる。また、最も効果的であるのは上記保持温度が1210℃前後であることもわかる。

*し、焼成した。焼成スケジュールを図3に示すように、成形助剤を焼き出すために350℃で1時間保持(KEEP 1)し、1210℃で0～12時間保持(KEEP 2)する以外は300℃/時間の速度で昇温し、最高焼成温度1425℃で1時間保持(KEEP 3)して焼成した。上記KEEP 2の保持時間を変化させ、得られた焼成体の収縮率、吸水率を測定した結果を表3および図4に示す。

【0021】

【表3】

実験例1と同様にハニカム形状に成形し、ついで乾燥 *

実験例2

No.	比較例	2-1	2-2	2-3	2-4
KEEP 2 の時間 (時間)	0	1	3	6	12
焼成収縮率 (%)	96.5	97.2	97.7	97.9	98.0
吸水率 (%)	25.2	27.5	29.2	29.3	29.5

【0022】この結果より明らかに、KEEP 2 の保持時間が0時間である比較例では収縮率97%以下、吸水

率26%以下であるのに対し、本発明実施例のNo.2-1~2-4は収縮率97%以上、吸水率27%以上とともに高い値を示した。また、KEEP2の保持時間が0.5時間以上になると大幅に収縮率、吸水率の上昇が見られ、それから徐々に上昇率は下がるもの最大12時間で収縮率は98%、吸水率は29.5%まで上昇し、それ以降はほとんど変化ないことがわかる。したがって、上記KEEP2の保持時間は0.5時間以上とすることによって、収縮率、吸水率を高くできることがわ*

実験例3

*かる。

【0023】実施例3

実験例1と同様にハニカム形状に成形し、ついで乾燥し、焼成した。焼成スケジュールを図5に示すように、1160~1290°Cの昇温時間を変化させて焼成し、得られた焼成体の収縮率、吸水率を測定した結果を表4に示す。

【0024】

【表4】

No.	比較例	3-1	3-2	3-3
1160~1290°Cの昇温時間(°C/時)	300	233	108	33
焼成収縮率 (%)	96.5	96.7	97.4	97.8
吸水率 (%)	25.2	26.2	26.7	27.9

【0025】この結果から1160~1290°Cの温度域で一定温度で保持するのではなく、昇温時間を300°C/時間以下とすることによって、上記実験例1、2と同様に収縮率、吸水率を高くできることがわかる。

【0026】

【発明の効果】このように本発明によれば、コーナライト質セラミックスの焼成条件中、1160~1290°Cの温度域において昇温速度を300°C/時間以下とするか、または1160~1290°Cの温度域で0.5時間以上一定温度で保持し、さらに1300~1440°Cの温度で0.5~2.4時間保持して、焼成することによって、焼結体の焼成収縮率、吸水率を高くする効果を奏すことができる。加えるに、1160~1290°Cの温度域における昇温速度または保持時間を調節することに

よって、自由に焼成体の焼成収縮率と吸水率をコントロールできるという効果を奏すことができる。

【図面の簡単な説明】

【図1】本発明のコーナライト質セラミックスの製造方法における焼成スケジュールを示すグラフである。

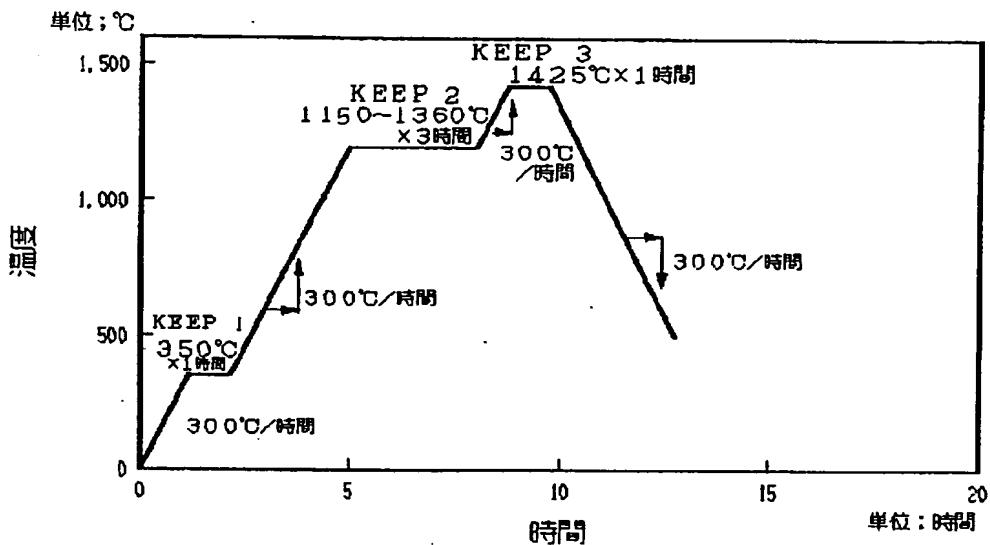
【図2】焼成中の保持温度と、得られた焼成体の収縮率、吸水率との関係を示すグラフである。

【図3】本発明のコーナライト質セラミックスの製造方法における焼成スケジュールを示すグラフである。

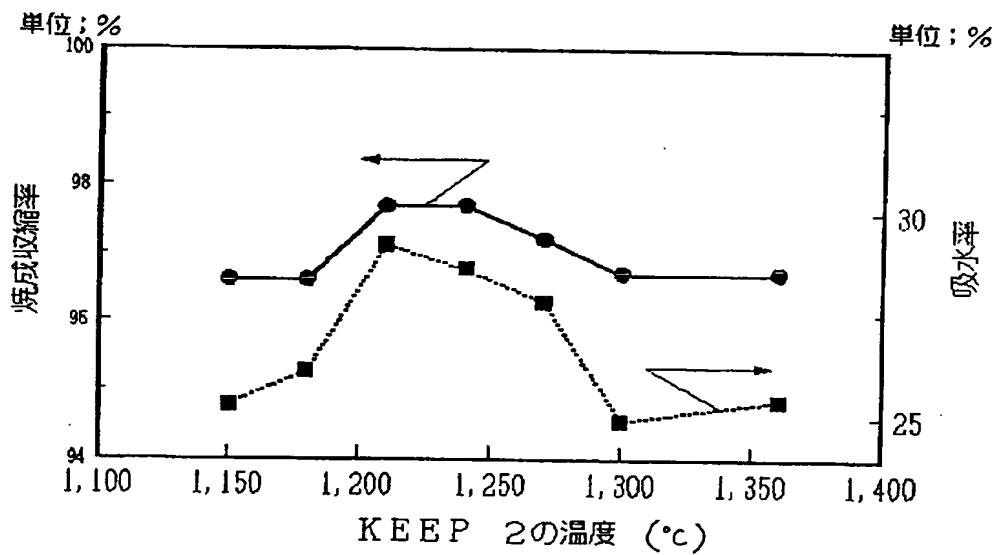
【図4】焼成中の保持時間と、得られた焼成体の収縮率、吸水率との関係を示すグラフである。

【図5】本発明の他の実施例における焼成スケジュールを示すグラフである。

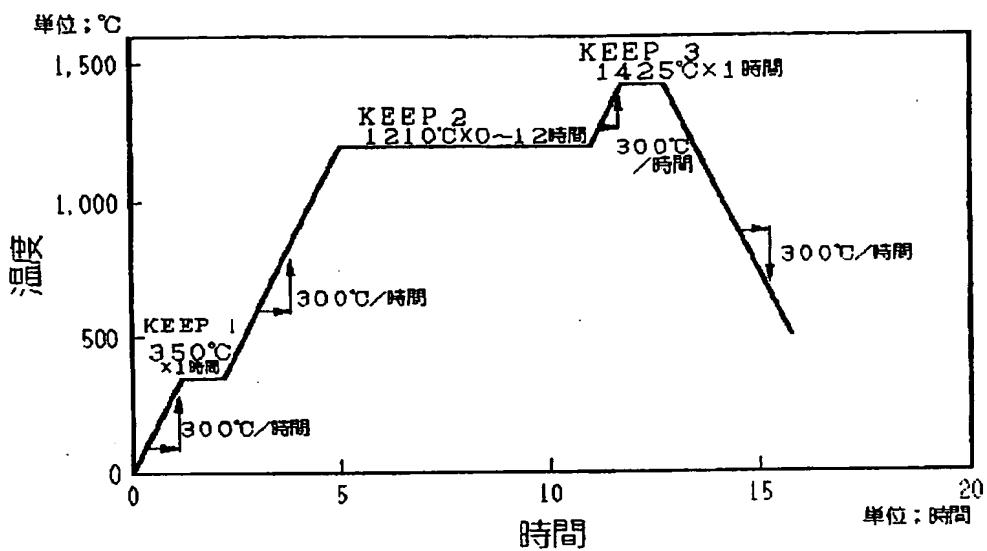
〔図1〕



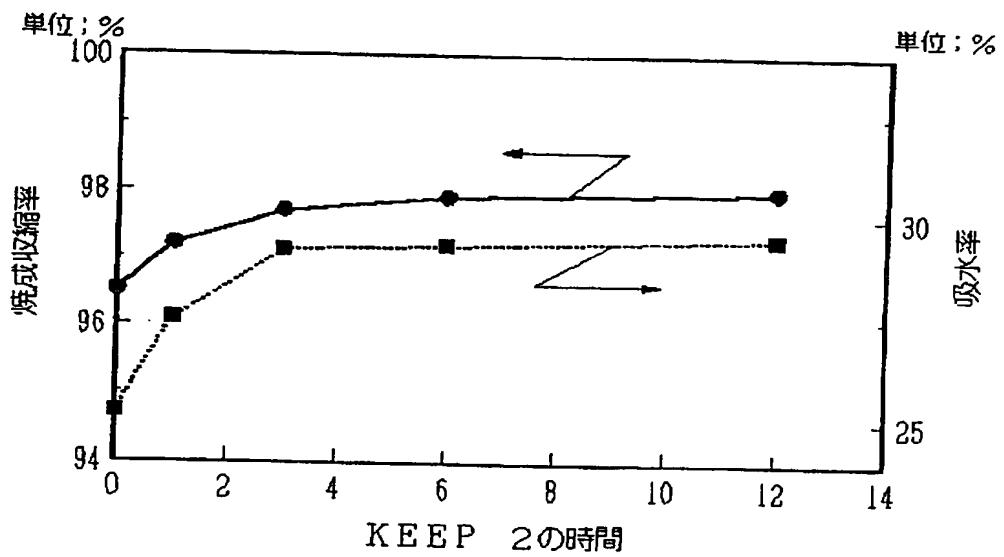
[図2]



【図3】



【図4】



【図5】

